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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. LXIX. JANUARY 8, 1909. NO. 3

H. F. NEWALL, Esq., M.A., F.R.S., PRESIDENT, in the Chair.

Samuel Butler, The Cedars, Compton, Wolverhampton;
Charles Everitt, 67 Boston Avenue, Southend-on-Sea;
J. William Gifford, Oaklands, Chard, Somerset;
James Thomas Jackson, M.A., Assoc.M.Inst.C.E., Engineering School, Trinity College, Dublin;
Dr. Arthur Scott King, Superintendent of the Physical Laboratory, Mount Wilson Observatory, California, U.S.A.;
Robert Owen, Merchant, 25 Mostyn Street, Llandudno, North Wales; and
Dr. Charles Edward St. John, Mount Wilson Observatory, California, U.S.A.,

were balloted for and duly elected Fellows of the Society.

The following candidates were proposed for election as Fellows of the Society, the names of the proposers from personal knowledge being appended:—

Edmund Sewall Manson, Jun., Assistant Professor of Astronomy, Ohio State University, Columbus, Ohio, U.S.A. (proposed by H. C. Lord); and
Robert Charles Slater, M.A., Assistant Master, Charterhouse, Godalming (proposed by J. Franklin-Adams).

Sixty presents were announced as having been received since the last meeting, including, amongst others:—

Astrographic Chart; 18 charts, presented by the Royal Observatory, Greenwich.

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Fluctuations in the Moon's Mean Motion.
By Simon Newcomb. (Plate 11.)

With the aid of my assistant Dr. Frank E. Ross, I have brought to a completion a study of the Moon's mean motion based on observations having an extreme range in time of about 2600 years. The data of observation are as follows:—

1. The eclipses of the Moon found in Ptolemy's Almagest, observed between B.C. 720 and A.D. 134.
2. Observations of eclipses by the Arabian astronomers, extending from 829 to 1004.
3. Observations of eclipses of the Sun and of occultations of stars by the Moon made by Gassendi, Hevelius, and others, from 1620 to 1680.
4. Observations of occultations of stars from 1670 until the present time.

The observations previous to 1750 were all worked up in my *Researches on the Motion of the Moon*, published in 1878. I have, however, subjected the results to a careful revision, and grouped them in a slightly different way from the former one. From and after 1680 the observations are of a fair degree of precision, but there are frequent gaps during the last half of the 18th century. The observations are fairly continuous since 1820.

Taken in connection with the recent exhaustive researches of Brown, which seem to be complete in determining with precision the action of every known mass of matter upon the Moon, the present study seems to prove beyond serious doubt the actuality of the large unexplained fluctuations in the Moon's mean motion to which I have called attention at various times during the past forty years. In the *Monthly Notices* for March 1903 is found a comprehensive review of the whole problem so far as it had then been developed, so that I need not enter into details at present. Indeed, the general conclusions reached in the work of 1878 have only been slightly modified in the present one.

The feature of most interest is the great fluctuation with a period of between 250 and 300 years. I call this a fluctuation rather than an inequality because, in the absence of any physical cause for its continuance, there is no reason to suppose that it will continue in the future in accordance with the law followed in the past. In the former paper I found it convenient to represent it as of the same period with the great Hansenian inequality due to the action of Venus. Singularly enough, the present research shows that the period which best represents it is still the same as that of the Hansenian inequality. In the former work I showed that the observed fluctuation could be represented by a mere change of sign of the constant term in the argument of this inequality.

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